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Academic Document

Climate Vulnerability of Informal Workers in Thailand: Cross-Sectoral Responses and Implementation Challenges

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Executive Summary

Thailand's over 21 million informal workers are confronting increasingly severe and complex challenges stemming from the climate change crisis. The most significantly affected groups are those engaged in outdoor occupations, including farmers, street vendors, food delivery riders, and various service providers. These are all workers who lack social security and possess limited adaptive capacity to climate change.

This report presents an analysis of data derived from in-depth interviews with 7 key relevant agencies: 1) Department of Climate Change and Environment (DCCE) 2) Climate Watch Thailand (CWT), 3) Thailand Environment Institute (TEI), 4) Bangkok Metropolitan Administration (BMA), 5) Department of Disease Control, 6) Ministry of Social Development and Human Security (MSDHS), and 7) Office of the Permanent Secretary, Ministry of Labor (OPS). Each agency offers distinct and diverse roles and perspectives. The key findings are summarized below, organized by their level of relevance:

National Policy-Level Agencies

- Department of Climate Change and Environment This department plays a role in policy formulation and the development of risk analysis tools, such as the Heat Index and Climate Smart Agriculture. However, the agency faces challenges due to a lack of knowledge and awareness among informal workers regarding the long-term impacts of climate change.

- Office of the Permanent Secretary, Ministry of Labor (OPS): The OPS supports both social protection and the advancement of the Draft Independent Labor Protection Act. They are also developing a high-risk labor Dashboard and a "Heat-Resilient, Disease-Resilient Skills" project. Nevertheless, they still confront the problem of dispersed workers who lack comprehensive access to the protection system.

Public Health and Social Agencies

- Department of Disease Control: This department develops health monitoring systems and heat hazard tools, such as the HeatTracker system and the establishment of specialized clinics. It also develops the Health Heat Index to issue warnings to outdoor workers. The main challenge lies in the communication gap for health information with informal worker groups who lack access to data and technology.

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- Ministry of Social Development and Human Security (MSDHS): The MSDHS focuses on caring for vulnerable groups through outdoor Safe Space projects, an emergency hotline for at-risk workers, and the Disaster Care Center for the Vulnerable (DCCV) system in 14 high-risk provinces. However, integrating informal workers into the welfare system sustainably remains a significant challenge.

Local and Civil Society Agencies

- Bangkok Metropolitan Administration (BMA): The BMA operates through projects like Shaping a Cooler Bangkok and the Urban Climate Data Hub to manage the Urban Heat Island effect. However, there is still a lack of clarity regarding its direct role concerning informal workers and limitations in managing pollution sources.

- Climate Watch Thailand (CWT): CWT works closely with informal workers at the community level and champions the concept of Just Transition through participatory risk assessment tools and scenario modeling. The challenges include a lack of public participation channels and ineffective cross-ministerial coordination.

- Thailand Environment Institute (TEI): TEI provides academic support through its Vulnerability Assessment Framework and a guidance manual for protecting workers in a warming world for local agencies. However, it faces issues with a weak linkage mechanism from policy to implementation..

Key Systemic Issues Identified

The analysis reveals three primary systemic issues: First, a lack of systematic cross-agency coordination mechanisms among the labor, public health, and environmental sectors. Second, operational scope at the local level remains limited and cannot specifically reach informal workers in various occupations. Finally, there is no integrated database for vulnerable workers that combines climate-related data, leading to a critical lack of information for appropriate planning and measure formulation.

Policy Recommendations

Based on the analysis of the roles and challenges of various agencies, it is found that addressing the issues faced by informal workers affected by climate change requires action in **6 key dimensions**:

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1) **Establishing an Integrated Data and Cross-Agency Coordination Mechanism**

Goal: To create an integrated database that links informal worker data with climate data at the local level.

Implementation Guidelines: Develop a central digital platform that gathers data from the Department of Climate Change and Environment (DCCE), the Department of Disease Control, and the Office of the Permanent Secretary, Ministry of Labor. Establish a national integrated committee comprising representatives from the labor, public health, and environmental sectors. Create a real-time data sharing system for rapid and accurate risk analysis and response.

2) **Developing an Early Warning System and Infrastructure for Outdoor Workers**

Goal: To reduce health risks for outdoor workers in urban areas.

Implementation Guidelines: Expand the Heat Index early warning system to cover all provinces and communicate through accessible channels for workers. Provide safe cooling areas at strategic points such as markets, transport hubs, and major intersections. Install basic facilities such as drinking water, misting fans, and health care advice signs.

3) **Strengthening Specialized Health Systems for Informal Workers**

Goal: To reduce health risks for outdoor workers from the impacts of climate change.

Implementation Guidelines: Expand health clinics for heat-related illnesses and air pollution to cover all at-risk provinces. Develop the HeatTracker system to link with local worker databases. Establish ad-hoc mobile units during severe weather conditions. Train Village Health Volunteers (อสม.) to specialize in outdoor worker healthcare.

4) **Capacity Building and Adaptation Skills Enhancement**

Goal: To increase the adaptive capacity of informal workers to climate change.

Implementation Guidelines: Develop specialized training courses such as techniques for working in hot weather and basic healthcare. Promote learning new occupational skills with flexible hours and locations, such as air conditioner repair and recycling. Organize training on financial risk management and savings to cope with disasters.

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5) Creating Financial and Welfare Support Mechanisms

Goal: To reduce the economic vulnerability of informal workers when facing disasters.

Implementation Guidelines: Establish an adaptation fund specifically for informal workers, particularly in directly affected agricultural and service sectors. Expand access to the State Welfare Card to cover emergency health expenses from disasters. Develop insurance products suitable for the income and work characteristics of informal workers.

6) Developing Legal Frameworks and Occupational Safety Standards

Goal: To create a comprehensive and sustainable protection system for informal workers.

Implementation Guidelines: Develop legal frameworks and occupational safety standards that consider the impacts of climate change. Establish outdoor work standards for severe weather conditions, specifying the right to stop work when temperatures exceed standard values. Create effective enforcement and monitoring mechanisms through local agencies.

Future Research Issues

To ensure policy formulation is grounded in robust empirical data and practical implementation, research should be conducted on three key issues:

1. Quantitative Impact Study on Informal Workers

Objective: To systematically analyze the impact of heat and air pollution on the income and health of informal workers.

Research Approach: Study income data and health expenditures of workers in specific occupations, such as farmers, riders, and street vendors. Analyze the relationship between the Heat Index and lost workdays and work efficiency. Evaluate the cost-benefits of various prevention and mitigation measures.

2. Pilot Project Implementation in Real-World Settings

Objective: To test the effectiveness and feasibility of a worker resting point policy in urban areas with high temperatures.

Research Approach: Select pilot areas in Bangkok and major cities, such as Phaya Thai, Bang Kapi, Khon Kaen, and Chiang Mai. Install prototype worker resting points and

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evaluate their actual usage. Measure the reduction in heat-related illnesses and user satisfaction. Develop a scalable model suitable for each area's context.

3. Development of a Just Transition Model

Objective: To create guidelines for worker participation in decision-making processes and measure design.

Research Approach: Study approaches to building informal worker networks and feedback mechanisms. Develop participatory vulnerability assessment tools that workers can use for self-assessment. Pilot participatory decision-making processes in designing protection measures at the community level. Evaluate the effectiveness of participation on the sustainability and acceptance of measures.

International Case Studies

The report presents a comparison of successful operational approaches from other countries, examining two key case studies that can be adapted to the Thai context.

Heat Action Plan - India

Key Lesson: Systematic management of heatwave risks in Ahmedabad.

Adaptable Approaches: A 3-5 day advance early warning system using easy-to-understand color codes; establishment of water stations and public shaded areas in high-density labor areas; training of public health volunteers in providing first aid; and communication through local languages and community-familiar channels.

Green Jobs for Waste Pickers Project - Brazil

Key Lesson: Professionalizing informal waste workers through the creation of environmentally friendly jobs.

Adaptable Approaches: Establishment of state-certified recycling worker cooperatives; professional skill development in waste sorting and management; fostering collaboration among government, private sector, and non-governmental organizations to support workers; and provision of protective equipment and creation of safe working environments.

Recommendations for Adaptation in Thailand: Both case studies offer approaches that Thailand can adapt to suit the specific context and needs of Thai informal

workers. The emphasis is on building sustainable systems, ensuring the participation of all sectors, and considering sociocultural differences.

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Document Structure

Climate Vulnerability of Informal Workers in Thailand: Cross-Sectoral Responses and

Implementation Challenges

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Part 1: Introduction

Background and Significance of the Problem

Climate change stands as one of the most significant challenges impacting all sectors of Thai society, particularly informal workers, who are highly vulnerable and possess limited adaptive capacity. Informal workers in Thailand number over 21 million, constituting more than half of the country's total workforce. This group includes street vendors, home-based workers, riders (food delivery workers), independent contractors, small-scale farmers, and various other self-employed individuals.

Within the context of climate change, this group of workers faces continuously increasing risks, including more severe heatwaves, escalating air pollution, flash floods, and prolonged droughts. These impacts not only affect the physical and mental health of workers but also their income, working environment, and daily life security. Simultaneously, most informal workers lack access to adequate health security and social protection systems, which further exacerbates their vulnerability when confronting the effects of climate change.

Overview of the Study

This report is compiled from in-depth interviews with representatives from government agencies, civil society organizations, and academic institutions that play a role in managing the impacts of climate change on informal workers. This study aims to collect perspectives, existing policy mechanisms, current measures, as well as challenges and recommendations for developing effective and sustainable protection guidelines for this group of workers.

The study encompasses an analysis of the roles of various agencies at both the policy and operational levels, an examination of current tools and measures, the identification of gaps and challenges in implementation, and the proposal of strategies for integrating cross-sectoral cooperation to enhance the coping and adaptive capacities of informal workers.

Objectives of the Study

This study has four main objectives:

1. To survey the roles and missions of agencies

To identify and analyze the roles, missions, and policies of relevant agencies in managing the impacts of climate change on informal workers, covering policy formulation, operational implementation, and service provision.

2. To analyze risks and vulnerabilities

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To study and analyze the risks and vulnerabilities of informal workers across various dimensions, including health and safety, income and economic security, and working environment.

3. To gather approaches and experiences

To survey and compile the operational approaches, experiences, and lessons learned by agencies in reaching out to and supporting informal workers, covering aspects of prevention, rehabilitation, and promoting adaptive capacity.

4. To propose systemic and coordination recommendations

To synthesize findings and propose systemic recommendations for developing informal worker protection guidelines, as well as effective and sustainable cross-sectoral coordination mechanisms.

Scope and Target Groups of the Study

This study focuses on informal workers highly vulnerable to the impacts of climate change, particularly those working outdoors and with unstable incomes. This group includes: small-scale farmers and agricultural laborers directly affected by changing weather patterns; street vendors and market stall owners who work in open spaces; riders and motorcycle taxi drivers who face air pollution and severe weather; construction workers and general daily wage laborers who work outdoors; and home-based workers and self-employed individuals who have insecure workplaces and lack protection systems.

The study covers various levels of agencies, ranging from national policy-level bodies, ministries and departments, local administrative organizations, to civil society organizations and academic institutions directly involved with this issue.

The presentation in each section will emphasize in-depth analysis, the integration of data from various sources, and synthesis to yield practical recommendations that can be effectively utilized in policy formulation and operational guidelines.

Informants/Data Sources

This study benefited from the cooperation of representatives from 7 key agencies involved in managing the impacts of climate change on informal workers. These include:

● Government agencies at the departmental and ministerial levels: Comprising the Department of Climate Change and Environment (DCCE), Ministry of Natural Resources and Environment; the Department of Disease Control, Ministry of Public Health; the Office of the

Permanent Secretary, Ministry of Labor (OPS), Ministry of Labor; and the Ministry of Social Development and Human Security (MSDHS).

- Local administrative organization: Bangkok Metropolitan Administration (BMA).

- Civil society and academic organizations: Comprising Climate Watch Thailand (CWT) – a civil society organization focusing on climate justice; and the Thailand Environment Institute (TEI) – an academic organization specializing in environmental affairs.

The interviews were conducted in May 2025 using a semi-structured in-depth interview format. The interview guidelines covered roles and missions, implemented measures and projects, understanding of informal worker vulnerability, operational challenges, and recommendations for future collaborative development.

Part 2: Research Methodology

This report employs a **Qualitative Research Methodology**, applying interview tools/guidelines developed by **Women in Informal Employment: Globalizing and Organizing (WIEGO)**. The approach focuses on gathering in-depth data from the experiences and perspectives of key stakeholders involved in the issue of informal workers within the context of climate change.

Data Collection: They was conducted through Key Informant Interviews with representatives from 7 agencies. These included government agencies at the departmental and ministerial levels, civil society organizations, and academic organizations. All of these agencies play crucial roles in policy formulation, project implementation, and supporting informal workers to adequately cope with the impacts of climate change.

Tools: The interviews used semi-structured interview approach, designed to cover the following key issues:

1) The agency's understanding of the impacts of climate change on informal workers.

2) Measures, projects, or tools currently being implemented by the agency.

3) Vulnerable worker groups according to each agency's assessment/targets/operational perspective.

4) Gaps in collaborative operations, including recommendations for developing cross-sectoral coordination mechanisms.

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Data Collection Period and Format: Interviews were held during May 2025, conducted both online and through on-site visits. The interview data was systematically transcribed and then analyzed using Thematic Analysis to synthesize commonalities and differences in policies, roles, and operational approaches of each agency, as well as the interconnections among related sectors.

Part 3: Conceptual Framework

This document relies on two primary conceptual frameworks for its analysis: "Climate Vulnerability" and "Just Transition." These frameworks were developed by the research team based on WIEGO's framework/questionnaire, and are used to evaluate the roles of relevant agencies and the appropriateness of their policies concerning informal workers in the context of climate change.

1. Climate Vulnerability: This concept comprises four main dimensions used in the analysis:

(1) Exposure to hazards and climate variability: Such as heatwaves, heavy rainfall, floods, or droughts, which can directly affect informal workers, especially those working outdoors or with unstable incomes.

(2) Adaptive Capacity: Referring to workers' readiness to change their work methods, access to knowledge, technology, or support from networks.

(3) Access to social protection systems: Such as healthcare systems, social security, state welfare, and emergency assistance programs, which help mitigate economic and health impacts when workers experience disasters.

(4) Access to infrastructure and public services: Such as transportation systems, basic utilities, safe shelters, and early warning communication systems, which play a crucial role in enhancing workers' ability to cope with and recover from climate impacts.

2. Just Transition: This framework focuses on designing policies and mechanisms for economic and environmental transition that leave no one behind. It particularly emphasizes caring for vulnerable workers and communities who may be affected by systemic adjustments, such as reducing reliance on fossil fuels or transforming future production and service models.

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Therefore, this document uses the conceptual frameworks detailed above as a basis for analyzing the roles of government agencies and various organizations, both in terms of policy and practice. This evaluation aims to assess how well existing mechanisms can respond to the vulnerability of informal workers and whether they align with the principles of "Just Transition."
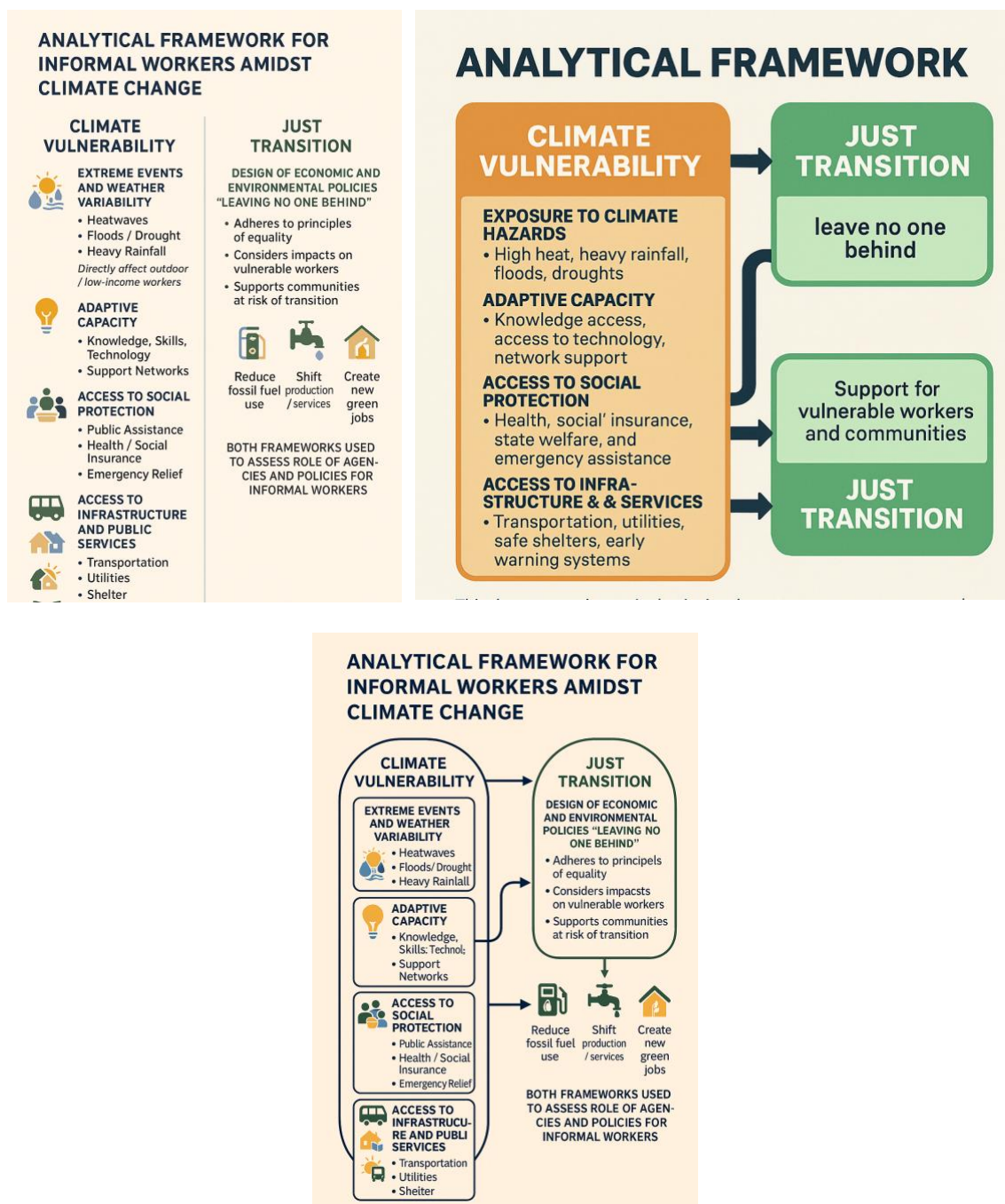
Diagram 1: Analytical Framework Developed by the research team (May, 2025).

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Part 4: Results of In-depth Data Analysis by Agency

This section presents the results of the analysis regarding the roles, operational approaches, and perspectives of various agencies concerning the vulnerability of informal workers amidst climate change. The content is organized by the agencies' main missions and operational levels, starting from those with roles in national policy formulation down to organizations working at the local and community levels.

The analysis for each agency will cover **five key aspects:** their main roles and missions related to informal workers; current measures and tools utilized; target groups and operational areas; challenges and limitations in their operations; and recommendations for developing collaborative work.

1. Department of Climate Change and Environment (DCCE)

Role and Main Missions: DCCE serves as a central agency responsible for driving policies on greenhouse gas reduction and adaptation to climate change, especially for directly affected groups such as informal workers in agriculture, fisheries, street vendors, and motorcycle taxi drivers. The department plays a crucial role in developing risk assessment tools and early warning systems, as well as transferring knowledge on climate adaptation to worker groups in collaboration with local administrative organizations and educational institutions.

Current Measures and Tools Utilized: The department has developed several key measures, including:

1) **Risk Map and Assessment Tool Development:** Creating risk maps and climate trend analyses to identify vulnerable groups by occupation. Developing an Early Warning System and Heat Index for alerting outdoor worker groups.

2) **Promoting Climate Smart Agriculture:** Encouraging farmers to adopt Climate Smart Agriculture practices, such as economical water use and selecting heat-tolerant crop varieties.

3) **Training and Knowledge Transfer:** Organizing training programs in collaboration with civil society, especially a project to train farmers in the Northeastern region on adapting cultivation patterns to changing seasons.

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Projects and Development Approaches: The department has established a "Climate and Disaster Data Analysis Center" to collect, analyze, and disseminate up-to-date risk information to relevant sectors, particularly in rural areas and regions with high concentrations of informal workers, such as the Central and Northeastern parts of Thailand. Additionally, the department coordinates with the Department of Agricultural Extension and educational institutions in target areas to organize training on using climate forecasting tools at the sub-district level. There are also pilot plans to create a local spatial database in conjunction with the Ministry of Labor's informal worker registration system.

Challenges and Limitations: The primary challenge faced by the department is the "lack of knowledge and awareness" among informal worker groups regarding Climate Change, particularly its long-term implications. People prioritize economic concerns over environmental ones, which leads to a lack of public support for policy adjustments.

"If we don't adapt, what will the future be like? They might not see that far... so knowledge needs to be provided to all groups." (DCCE)"

Recommendations and Development Approaches: The department proposes linking data with the Ministry of Labor and the MSDHS to develop a centralized database for vulnerable workers, enabling local agencies to access risk information more quickly for policy decision-making.

"They need to adapt in time." (DCCE)"

2. Climate Watch Thailand (CWT)

Role and Main Missions: CWT is a civil society organization working on **Climate Justice** and labor, with a focus on **Just Transition** for informal workers. The organization plays a crucial role as a bridge between national policies and the needs of workers at the community level.

Operational Approaches: CWT operates through several key mechanisms:

- **Policy Advocacy and Participation:** This includes advocating for environmental policies to be linked with labor rights, especially at the local level. It also involves collecting field data directly from informal workers (e.g., street vendors, domestic workers, etc.), developing risk assessment models, and creating platforms for workers to voice their concerns.

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- **Development of Learning Tools:** CWT develops **participatory learning tools**, such as **scenario planning models**, for use in community-level workshops. These models simulate the impacts of drought or heatwaves on workers' income and expenses.

- **Development of Analysis Toolkits:** CWT is developing an **"Impact Analysis Toolkit for Workers"** using participatory methods and in-depth field data collection on specific issues, such as losses from storms and stress from unstable incomes.

Policy Recommendations:

CWT proposes the establishment of an **"Informal Worker Adaptation Fund,"** managed by an independent organization in collaboration with labor organizations, to cover costs arising from disasters and changing climate conditions. Furthermore, it supports informal workers in forming **savings groups and labor networks** to create a long-term social security foundation, linking with local mechanisms such as Sub-district Administrative Organizations (Or Bor Tor) and Village Health Volunteers (Or Sor Mor) groups.

Challenges and Limitations: The significant challenges include a "lack of public participation channels" and "ineffective cross-ministerial coordination." The government and communities "speak different languages," which hinders the effective implementation of Climate Justice policies for informal workers.

*" The significant challenges include a **"lack of public participation channels"** and **"ineffective cross-ministerial coordination."** The government and communities "speak different languages," which hinders the effective implementation of Climate Justice policies for informal workers.* (CWT)

Additionally, CWT offered an interesting perspective on informal workers:

"Informal workers don't need to know climate change theory; they live with it already." (CWT)

3. Thailand Environment Institute (TEI)

Role and Main Missions: TEI functions as an academic support organization for government agencies, focusing on Climate Adaptation planning and local capacity building. Its core mission is to foster a deep understanding of the vulnerability of informal workers.

Analysis and Observations: TEI has identified significant trends among informal worker groups: informal workers reliant on natural resources, such as farmers and local

fishers, face high risks from disasters and temperature fluctuations. Urban workers, such as motorcycle taxi drivers and street food vendors, have limited adaptation options.

" Urban groups are no less vulnerable than rural ones, but they have fewer options for adaptation." (TEI)

Tools and Operational Approaches:

- **Systemic Analytical Framework/Tool:** TEI utilizes a "Vulnerability Assessment Framework" specifically designed for informal occupational groups, which measures economic, environmental, and health-related vulnerabilities.

- **Area-Specific Studies:** Studies supported by GIZ reveal that urban workers face high risks from heat stress but lack access to shaded areas or warning systems. TEI proposes urban planning focused on temperature reduction, such as increasing green spaces at informal worker resting points.

- **Local Capacity Building:** TEI has organized training workshops for local officials in the Northern and Southern regions, providing knowledge on climate risk and systematic vulnerable group analysis. They have also developed a "Guidelines for Protecting Workers in a Warming World" manual for practical use at the district level.

Data Integration: TEI promotes the integration of field research data with government databases to enable evidence-based policy formulation that clearly targets specific groups.

Challenges and Limitations: The major problem is that the

" Linkage mechanism between policy and implementation remains weak"

Even with national-level plans in place, local operational units still lack "capacity" and "understanding" regarding Climate Change, especially those working with informal workers.

"Good guidelines can be written by anyone... but operational units still need to enhance their capacity." (TEI)

4. Bangkok Metropolitan Administration (BMA)

Role and Main Missions: The BMA formulates its Climate Action Plan with support from JICA and the World Bank, emphasizing Urban Heat Island effects and dust pollution. However, its direct role regarding informal workers remains unclear, especially for groups "without clear affiliation" such as street vendors or food delivery riders.

Related Measures and Projects:

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- **Shaping a Cooler Bangkok Project:** In collaboration with researchers from Thammasat University, this project studies "heat hotspots," particularly in areas with a high concentration of informal workers, such as Asoke Intersection or Chatuchak Weekend Market.

- **Urban Area Design:** The BMA is undertaking spatial planning within the "Shaping a Cooler Bangkok" project in areas like Phaya Thai and Pathum Wan. Proposals from this project include providing shaded resting areas for food delivery riders, supporting mobile trees in weekend markets, and designing pavements that can serve as resting points during extreme heat.

- **Data and Monitoring Systems:** The BMA has begun piloting the "Urban Climate Data Hub" system to collect data on heat, income, and public health in Klong Toey and Bang Sue districts, with the goal of expanding to areas with high informal worker density, such as Lat Phrao and Bang Kapi.

- **Pilot Project:** The BMA, in collaboration with a private company, has established prototype "safe worker resting points" near markets and major roads. These points are equipped with misting fans and temperature warning signs to accommodate street vendors, food delivery riders, and market vendors.

Limitations and Challenges:

"We try to solve the problem, but it persists, because the BMA doesn't have the authority to manage it directly" (BMA)

- **Lack of clear direct role regarding informal workers:** There is no specific plan for informal workers, though the BMA acknowledges urban vulnerability. Furthermore, it relies on external agencies for implementation, with the BMA's role remaining at the planning level only.

- **Air pollution is a major challenge,** but the BMA lacks direct authority to manage its sources, relying on external integration.

5. Department of Disease Control

Role and Main Missions: The Department of Disease Control views health impacts from climate conditions, such as heatwaves and haze, as having severe effects on outdoor informal workers. The department plays a crucial role in developing health monitoring systems and providing specialized medical services.

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Key Measures and Tools:

- Risk Assessment and Monitoring Systems

- Develops health risk assessment forms for specific occupational groups.

- Establishes health and heat hazard monitoring systems, such as the HeatTracker system.

- Health Heat Index and Warning System: The department plans to develop a Health Heat Index, categorizing risks by color symbols (e.g., orange for risk, red for danger) for easy understanding by workers, along with recommendations for breaks or water consumption.

- Establishment of Specialized Clinics: It has established "Heat-Related Health Hazard Clinics" in 20 central and community hospitals, offering free consultations to informal workers. Mobile units are also dispatched during the hot season.

- Community-Level Capacity Building: Village Health Volunteers (อสม.) are trained to use the HeatTracker application to monitor at-risk patients and submit monthly reports to provincial public health offices for proactive decision-making.

Communication and Knowledge Dissemination: The department disseminates information through Line Official, TikTok, and warning signs in communities, and collaborates with other agencies to communicate with informal workers. It also emphasizes coordination with Village Health Volunteers and local partners to collect data on heat-related illnesses among workers, especially heatstroke and respiratory diseases.

Challenges and Limitations: A significant limitation is the "communication gap for health information" with informal worker groups who lack access to information. Although manuals and warning systems exist, their utilization remains limited to those with access to technology.

"There is still a gap in accessing information or understanding... Communication should be adapted to suit worker groups" (Department of Disease Control)

Perspective on Vulnerability:

"Informal workers in urban areas face greater inequality than those in rural areas because they lack support systems from local authorities." (Department of Disease Control)

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6. Ministry of Social Development and Human Security (MSDHS)

Role and Main Missions: The MSDHS primarily focuses on social aspects, caring for vulnerable groups such as women, the elderly, persons with disabilities, and at-risk informal workers. The ministry aims to create a comprehensive and accessible social protection system for groups with limited adaptive capacity to climate change.

Measures and Projects:

- **Occupational Skills Development and Income Generation:** Providing vocational training in areas such as beauty services, food preparation, and traditional Thai massage, specifically targeting groups like single mothers.

- **Utilizing** a vulnerable household database for planning assistance.

- **Early Warning and Emergency Response Systems:** Establishing Disaster Care Centers for the Vulnerable (DCCV) to respond to disasters in 14 high-risk provinces. Currently planning an Early Response system for vulnerable worker groups, using data from social assistance centers to analyze areas with outdoor female and elderly workers, such as morning markets or roadside areas in urban communities.

- **Integration with Welfare Systems:** The MSDHS proposes integration with the State Welfare Card project to enable vulnerable workers to access emergency health funds when affected by climate-related disasters.

Pilot Projects and New Approaches:

- **Outdoor Safe Space Project:** The MSDHS has partnered with municipalities in major urban areas like Khon Kaen and Chiang Mai to provide daytime cooling areas with shade, drinking water, and forums for financial and health education for workers.

- **Emergency Hotline for At-Risk Workers:** A pilot system for an "Emergency Hotline for At-Risk Workers" has been launched for use during severe disaster events. This hotline will connect with local agencies such as public health, rescue foundations, and local administrative organizations.

Challenges and Limitations: The key challenge is "attracting informal workers into the social protection system" sustainably. Rights obtained in specific situations (e.g., floods) are not equivalent to having a permanent system like social security. "If they can enter the social security system, they will receive more comprehensive rights." (MSDHS)

Perspective on Protection

"We emphasize protecting groups with limited adaptive capacity." (MSDHS)

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7. Office of the Permanent Secretary, Ministry of Labor (OPS)

Role and Main Missions: OPS is the agency responsible for setting the direction of national labor policy, with a strong focus on the over 21 million informal workers. The agency plays a crucial role in developing laws and policies to protect informal workers, particularly in the context of climate change.

Key Approaches and Policies: These include:

- **Legal Framework Development:** Such as the Draft Independent Labor Protection Act and the establishment of a specialized fund, the "Independent Labor and Vulnerable Groups Policy Fund."

- **Promoting Access to Welfare:** By encouraging workers to enroll in Social Security Section 40 and providing funding for vocational training and skill upgrading.

Projects and Development Approaches:

- **Database Integration and Skill Development:** The OPS prioritizes integrating the informal worker database with the Department of Skill Development's skill development system. This will involve developing an "online short-term skills training platform" for occupations affected by climate change, such as air conditioning technicians and agricultural equipment repairers.

- **Promoting Work Standards:** There are efforts to integrate disaster risk assessment as part of local outstanding labor standards, to incentivize employers to provide protection for informal employees.

- **Heat-Resilient, Disease-Resilient Skills" Project:** (Currently ongoing) This is a **hybrid short-term training course** conducted in collaboration with vocational colleges in 10 pilot provinces. It focuses on adapting occupations, such as service-sector air conditioning work and recycling, which offer time flexibility.

Data and Analysis System There are plans to develop a central "High-Risk Informal Worker Map" dashboard, utilizing AI to analyze data from the Meteorological Department and statistics from the Social Security Office, for policy proposals to the Cabinet.

Perception of Impacts and Risks: The OPS clearly states that outdoor workers face "high temperatures, pollution, and health risks," but still lack clear protection. Data systems and access to support remain limited due to the dispersed nature of these workers.

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" The costs (for workers/occupations) may increase; they have to buy sun and rain protection equipment... high health risks from outdoor work." (OPS.)

<u>Challenges and Limitations:</u> The main challenge is the "lack of a protection system that meets the needs of dispersed outdoor workers who lack access to support." Most informal workers operate outside the formal protection system and are scattered across diverse areas and occupations, making access and support provision challenging.

" Informal workers lack protection... this is the biggest challenge the Ministry of Labor faces." (OPS)

Part 5: Analysis of Common Issues and Dimensional Differences Across Agencies

From the analysis of data from all 7 agencies, both common issues and dimensional differences in responding to the impacts of climate change on informal workers were found, as detailed below:

5.1 Key Commonalities

- All agencies acknowledge the vulnerability of informal workers, especially those in outdoor occupations such as farmers, motorcycle taxi drivers, and street vendors, who are directly affected by fluctuating weather conditions.

- There is a shared understanding of the urgent need to develop tools and early warning systems to enable informal workers to prepare and reduce risks promptly.

- Many agencies emphasize the importance of data integration and fostering collaboration between agencies, both at the government and civil society levels, to ensure effective and comprehensive management.

- There is a tendency to support operations in terms of "Adaptation" to the impacts of climate change, rather than solely focusing on "Mitigation," especially at the practical operational level.

5.2 Differences Among Agencies

The analysis reveals that different agencies have diverse operational approaches based on their roles and contexts, as follows:

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Environmental government agencies, such as the Department of Climate Change and Environment (DCCE) and the Thailand Environment Institute (TEI), prioritize policy planning and the development of structural climate change tools. Their operations tend to be top-down, which may not directly address community-level needs.

Social agencies, such as the Ministry of Social Development and Human Security (MSDHS) and the CWT project, possess a greater understanding of the local context and the vulnerability levels of informal workers at the community level, emphasizing a bottom-up approach.

The Bangkok Metropolitan Administration (BMA) has a limited practical role, primarily focusing on physical and urban planning rather than direct individual worker care.

The Office of the Permanent Secretary, Ministry of Labor (OPS), plays a policy-making and labor law drafting role but still lacks clear mechanisms to drive policies into implementation at the local level.

5.3 Identified Gaps

Although many agencies have roles and objectives in responding to the impacts of climate change on informal workers, there are still significant gaps that need to be addressed as follows:

- There is a lack of systematic coordination mechanisms among labor, environmental, and public health agencies, which are the main sectors involved with vulnerable workers.

- There has been no development of an integrated database that combines environmental risks with labor data at the local level, resulting in a lack of in-depth information for planning assistance.

- The system for communicating climate threat information to informal workers is not yet comprehensive or continuous.

Part 6: Comparative Analysis of Agency Roles

This document presents a comparative table of the roles of various agencies involved with informal workers within the context of climate change, building upon the textual analysis.

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Table 1: Roles of Agencies in Informal Labor and Climate Change

Agency	Primary Role	Target Areas	Relevant Worker Groups	Key Interventions
Department of Climate Change and Environment (DCCE)	Climate planning, risk analysis	Agricultural and rural areas	Farmers, street vendors	Early warning systems, Climate-Smart Agriculture
Climate Watch Thailand (CWT)	Civil society engagement, policy advocacy	Rayong, Phitsanulok	Market vendors, domestic workers	Just transition frameworks, community forums
Thailand Environment Institute (TEI)	Technical support and local training	Northern and southern regions	Nature-dependent workers	Vulnerability assessments, localized manuals
Bangkok Metropolitan Administration (BMA)	Urban planning and heat mitigation	Urban districts	Delivery riders, street vendors	Cooler city zones, labor rest stations
Department of Disease Control	Outdoor labor health monitoring	All regions	Construction workers, delivery riders	Heat clinics, HeatTracker system
Ministry of Social Development and Human Security (MSDHS)	Protection of vulnerable groups	Urban communities, women	Single mothers, the elderly	Safe spaces, social support hotlines
Office of the Permanent Secretary, Ministry of Labour (OPS)	Labour policy development	National level	All categories of independent workers	Draft legislation, High-Risk Labour Dashboard

(Translation)

Table 2: Roles of Agencies Categorized by 3 Main Dimensions

| Agency	Dimension 1: Clarity of Mandate	Dimension 2: Availability of Tools/Measures	Dimension 3: Understanding of Informal Workers' Lived Experience
Department of Climate Change and Environment (DCCE)	High (clear policy-level mandate)	Possesses climate planning and data tools	Low (focuses more on environmental aspects than labour issues)
Thailand Environment Institute (TEI)	Moderate	Offers research frameworks and policy recommendations	Moderate (has relevant data, but not specifically labour-focused)
Office of the Permanent Secretary, Ministry of Labour (OPS)	High (labour policy authority)	Possesses policy plans and draft legislation	Low (limited understanding of local/community contexts)
Ministry of Social Development and Human Security (MSDHS)	High (clear social mandate)	Operates support programs for vulnerable groups	High (close engagement with communities)
Climate Watch Thailand (CWT)	Moderate	Engages directly with workers	High (emphasizes workers' lived realities)
Bangkok Metropolitan Administration (BMA)	Moderate	Urban planning and sanitation policies available	Low (focuses on infrastructure more than individuals)
Department of Disease Control	Moderate	Health data and disease response plans available	Moderate (data on at-risk groups, but not specific to informal workers)

Note:

- This analysis uses qualitative scoring, based on in-depth interview data and documents from each agency.
- The levels used are: High, Moderate, and Low.

Part 7: Overall Diagram of Roles and Coordination

This diagram illustrates the interconnections among agencies based on their main roles and target worker groups.

(Translation)
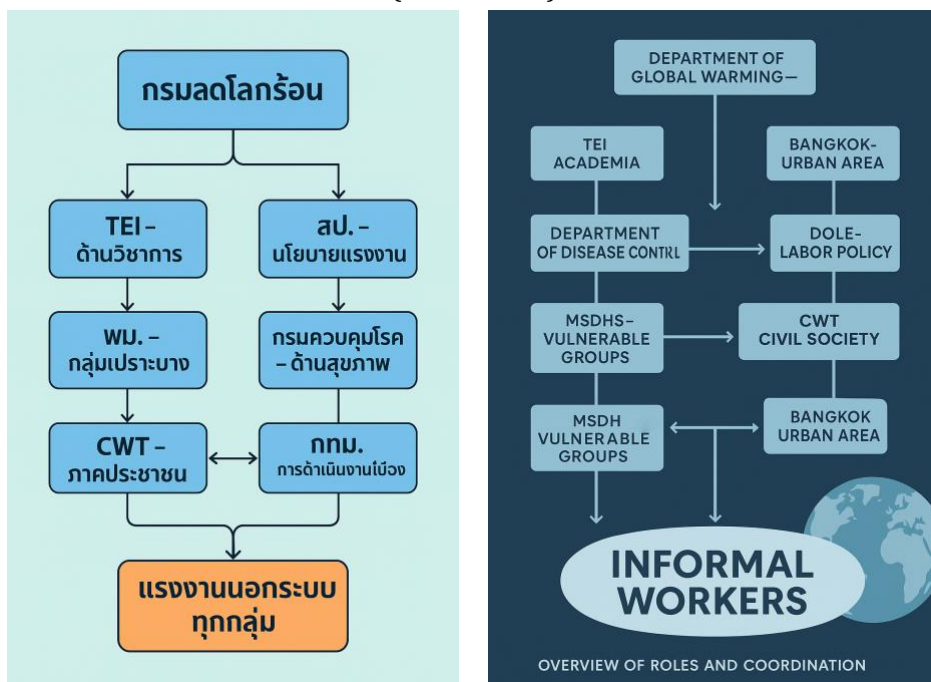
Overall Description:

1) DCCE acts as the primary agency for climate change, linking with both academic institutions (TEI) and government labor sectors (OPS).

2) TEI provides academic and database support, with relevance to the MSDHS which conducts on-site care for vulnerable groups.

3) OPS is responsible for labor policy, working with the Department of Disease Control to address the health dimension of workers.

4) CWT and the BMA play roles in actual operations at the urban community level, with close coordination between them.

5) At the center of the system are **all groups of informal workers**, who are the primary recipients of impacts from climate change.

Part 8: Comparative Analysis of Agency Roles and Research Proposals

8.1 Comparative Analysis of Agency Roles

1) Clarity of Role:

Agencies with clear national policy-making roles include the **Department of Climate Change and Environment (DCCE)** and the **Office of the Permanent Secretary, Ministry of Labor (OPS)**, which possess the authority to set macroeconomic policy frameworks concerning climate change and labor.

Meanwhile, operational-level agencies like **CWT** and the **Ministry of Social Development and Human Security (MSDHS)** demonstrate a deep understanding of the social context of informal workers, particularly their vulnerability by occupation and area.

2) Existence of Tools and Support Systems:

Agencies with tools or projects that have genuinely commenced operations at the local level include:

- DCCE, which has developed the Heat Index tool.
- The Department of Disease Control, which has established Heat Hazard Clinics in at-risk areas.
- The MSDHS, which promotes Safe Spaces for vulnerable workers.
- In contrast, the OPS and BMA are still in the phase of policy design and pilot projects.

3) Specific Understanding of Informal Workers' Lives:

- - CWT and the MSDHS demonstrate an understanding of the lives of specific informal occupations, such as street vendors, domestic workers, food delivery riders, etc.
- The Department of Disease Control possesses comprehensive health data and information on at-risk groups, particularly concerning environmental risk factors like heatwaves and PM2.5.

8.2 Proposed Research Issues to Be Conducted

1) Academic Research Issues:

- Analysis of the impact of heatwaves and air pollution on the health and income of informal workers in outdoor occupations.

- Development of Spatial Vulnerability Mapping for urban worker groups, such as riders and market vendors.

- Development of an environmental economic model to assess the costs and benefits of climate policies for informal workers.

(Translation)

2) Action Research Issues:

- Pilot testing a "safe worker resting point" system in hot urban areas such as Phaya Thai and Bang Kapi.

- Designing an Early Warning communication system via a Mobile App specifically for informal workers.

- Creating a community-level cooperation model among labor organizations, municipalities, and street vendor networks to develop local adaptation funds.

8.3 Examples of Relevant International Projects

1) South Africa

Project: Just Transition Pathways for Informal Workers

By: WIEGO and the University of Witwatersrand

Key Concept: Just transition pathways for street vendors in Johannesburg, including safe zoning, and worker participation in policy-making. (WIEGO Reference)

2) India

Project: Heat Action Plan – Ahmedabad

Key Concept: The first city in Asia to integrate heatwave warnings comprehensively for informal workers, including water points, shaded areas, and community-based alerts. (NRDC Reference)

3.3 Brazil

Project: Green Jobs for Informal Waste Pickers – São Paulo

Key Concept: Supporting informal recycling workers to access labor rights, welfare, and occupational recognition through collaboration between government and NGOs. (ILO Reference)

Part 9: Challenges for Agencies in Supporting Informal Workers Amidst Climate Change

In-depth interviews with representatives from 7 agencies have revealed significant challenges that each agency faces in their operations to care for informal workers within the context of climate change. These challenges span policy, implementation, and coordination mechanisms among sectors.

(Translation)

(Translation)

9.1 Key Challenges

Table 3: Summary of Key Challenges for Each Agency

Agency	Key Challenges
Department of Climate Change and Environment (DCCE)	Lack of knowledge and awareness among informal workers regarding climate change and its long-term impacts.
Climate Watch Thailand (CWT)	Limited channels for worker participation and insufficient coordination between government and community actors.
Thailand Environment Institute (TEI)	Weak mechanisms for translating national-level plans into practice; local implementation units lack sufficient capacity.
Bangkok Metropolitan Administration (BMA)	Unclear mandate regarding informal workers; lacks authority to address pollution sources; insufficient public communication; green/cool city initiatives remain in the design phase without concrete implementation.
Department of Disease Control	Gaps in health communication; informal workers have limited access to tools and information.
Ministry of Social Development and Human Security (MSDHS)	Sustaining informal workers' integration into the welfare system remains a key challenge.
Office of the Permanent Secretary, Ministry of Labour (OPS)	Absence of a comprehensive protection system for outdoor workers; dispersed nature of the informal workforce hinders effective outreach and support.

(Translation)

9.2 Specific Differences in Agency Challenges

Table 4: Comparative Differences in Specific Agency Challenges

Agency	Distinctive Challenge Focus
Department of Climate Change and Environment (DCCE)	Emphasizes systemic and national-level policy issues that have yet to be effectively communicated to the worker level.
Climate Watch Thailand (CWT)	Highlights the absence of worker voices in policy processes and the lack of participatory mechanisms for the public.
Thailand Environment Institute (TEI)	Focuses on the weak link between policy formulation and implementation at the local level.
Bangkok Metropolitan Administration (BMA)	Faces limitations in local administrative authority and environmental management capacity.
Department of Disease Control	Points to digital inequality and communication gaps affecting vulnerable worker groups.
Ministry of Social Development and Human Security (MSDHS)	Stresses persistent social vulnerabilities and the lack of a permanent support system.
Office of the Permanent Secretary, Ministry of Labour (OPS)	Takes a structural view, emphasizing the absence of a sustainable welfare system for informal workers.

9.3 Shared Structural Challenges

The analysis also points to **"shared challenges"** reflected across multiple agencies, as follows:

1) Insufficient Understanding/Awareness among Informal Workers:

- Many workers are unaware of the dangers of climate change, especially its long-term dimensions.

- Knowledge dissemination does not yet adequately cover high-risk worker groups, such as street vendors, riders, and farmers.

2) Communication Systems Do Not Reach Workers:

- Health information and warning systems exist, but many informal workers cannot access them.

- There are limitations concerning technology, language, and group-specific channels.

3) Ineffective Public Communication and Awareness Building:

(Translation)

- The general public still lacks understanding of the vulnerability of informal workers to climate change.

- Government communication has not effectively generated public understanding and participation in assisting vulnerable worker groups.

- There is a lack of diverse media and communication channels to reach different target groups.

4) Inadequate Welfare System Coverage:

- Most informal workers are not part of the social security system

- Rights in emergency situations are still "ad-hoc" rather than part of a sustainable care system, such as social security.

5) Lack of Cross-Agency Coordination Mechanisms:

- Disaster management and climate change impact responses are still characterized by siloed operations.

- There is no permanent platform connecting labor, public health, and environmental agencies.

5) Weak Local-Level Implementation:

- Despite clear national plans, actual implementation faces limitations in terms of personnel, budget, and specialized understanding.

- Local administrative organizations still lack knowledge and awareness regarding the impacts of climate change on informal workers.

- There is a shortage of local officials who understand and are aware of the climate dimension and the context of informal workers in their areas.

Part 10: Policy Recommendations

To enhance the protection of informal workers from the impacts of climate change, the following policy actions are proposed:

- Establish a national joint working committee with the mission of integrating informal worker data with climate risk information, to serve as a central database for planning and resource allocation.

- Develop an early warning system that can link with local worker databases, along with a communication system that is easy to understand and genuinely accessible to target groups.

- Strengthen specialized health systems for informal workers by expanding heat and air pollution health clinics to cover all at-risk provinces, developing the HeatTracker system to link with local worker databases, and establishing ad-hoc mobile units during severe weather conditions, along with training Village Health Volunteers (OrSorMor.) to specialize in outdoor worker healthcare.

- Support an adaptation fund for informal workers, especially those in outdoor occupations who lack social security, such as farmers, riders, and street vendors.

- Increase urban worker resting areas that are shaded, safe, and have appropriate sanitation systems, such as resting points for riders, street vendor resting points, etc.

- Develop legal frameworks and occupational safety standards that consider the impacts of climate change, such as establishing outdoor work standards for severe weather conditions, specifying the right to stop work when temperatures exceed standard values, and creating effective enforcement mechanisms through assessment and monitoring by local agencies.

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(Translation)

Challenges in Supporting Informal Workers Amidst Climate Change

DEPARTMENT OF CLIMATE CHANGE

Lack of knowledge and awareness among informal workers on climate-change and long-term effects

CLIMATE WATCH THAILAND (CWT)

Lack of participation channels for workers and ineffective government—community

THAILAND ENVIRONMENT INSTITUTE (TEI)

Weak linkages from national planning to implementation and limited capacity of implementing units

BANGKOK METROPOLITAN ADMINISTRATION (BMA)

Unclear role toward informal workers and no authority to manage sources of pollution

DEPARTMENT OF DISEASE CONTROL

Communication gaps in health information inaccessibile tools and data for informal workers

MINISTRY OF SOCIAL DEVELOPMEN AND HUWAN SECURITY

Challenges in bringing informal workers into a oustainable welfare system

MINISTRY OF LABOR

Lack of protective systems for outdoor workers dispersed and without access to support

Shared Challenges

- Inadequate understanding/awareness of informal **workers**
- Communication systems inaccessible to in**formal workers**
- Welfare systems **not** covering informal workers

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